

Appl. No. 10/822583

In the Claims:

Listing of all claims:

1-47 (Cancelled.)

1           48. (Currently Amended) An apparatus for welding by  
2     depositing drops of molten metal at the end of a  
3     consumable welding wire into a weld puddle by short  
4     circuit transfer welding, comprising:  
5           a power source having a first waveform during a  
6     short condition and a second waveform during an arc  
7     condition as an output, wherein the output is in  
8     electrical communication with the welding wire;  
9           a feedback circuit, for providing a signal  
10    indicative of the output being in the short or the arc  
11    condition and further having as an output a real-time  
12    signal indicative of the heat input to each drop;  
13           a controller, coupled to the feedback circuit,  
14    and having a control output provided to the power source,  
15    wherein the control output commands the first waveform to  
16    have a desired and controlled current waveform and the  
17    second waveform to have a desired and controlled voltage  
18    waveform.

1           49. (Previously Presented) The apparatus of claim  
2     48, wherein the feedback circuit includes a comparator.

1           50. (Previously Presented) The apparatus of claim  
2     49, wherein the comparator receives a threshold voltage and a  
3     signal responsive to output voltage as inputs.

51. (Cancelled.)

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1           52. (Currently Amended) The apparatus of claim ~~48~~  
2 ~~51~~, wherein the controller controls the first and second  
3 waveforms to provide a desired mass deposition rate responsive  
4 to a wire feed speed and a distance from a tip of the wire to  
5 the workpiece.

1           53. (Previously Presented) The apparatus of claim  
2 52, wherein the feedback circuit has an output current  
3 feedback signal and an output voltage feedback signal provided  
4 to the controller, and wherein the controller controls the  
5 first waveform in response to the output current feedback  
6 signal and the second waveform in response to the arc voltage  
7 feedback signal.

1           54. (Previously Presented) The apparatus of claim  
2 48, wherein the feedback circuit has an output current  
3 feedback signal and an output voltage feedback signal provided  
4 to the controller, and wherein the controller controls the  
5 first waveform in response to the output current feedback  
6 signal and the second waveform in response to the arc voltage  
7 feedback signal.

1           55. (Currently Amended) An apparatus for welding by  
2 depositing drops of molten metal at the end of a  
3 consumable welding wire into a weld puddle by short  
4 circuit transfer welding, comprising:  
5           power means for providing power in the form of  
6 a first waveform during a short condition and a second  
7 waveform during an arc condition to the welding wire;  
8           feedback means for providing a signal  
9 indicative of the output being in the short or the arc  
10 condition and for providing a real-time signal indicative  
11 of the heat input to each drop;

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12 control means for controlling the power means  
13 in response to the feedback means, wherein the power  
14 means is controlled such that the first waveform has a  
15 desired and controlled current waveform and the second  
16 waveform has a desired and controlled voltage waveform.

1 56. (Previously Presented) The apparatus of claim  
2 55, wherein the feedback means includes a means for comparing  
3 two signals.

1 57. (Previously Presented) The apparatus of claim  
2 56, wherein the comparator means receives a threshold voltage  
3 and a signal responsive to output voltage as inputs.

58. (Cancelled.)

1 59. (Previously Presented) The apparatus of claim  
2 57, wherein control means includes means for controlling the  
3 first and second waveforms to provide a desired mass  
4 deposition rate responsive to a wire feed speed and a distance  
5 from a tip of the wire to the workpiece.

1 60. (Previously Presented) The apparatus of claim  
2 55, wherein the feedback means provides an output current  
3 feedback signal and an output voltage feedback signal provided  
4 to the control means, and wherein the control means includes  
5 means for controlling the first waveform in response to the  
6 output current feedback signal and the second waveform in  
7 response to the arc voltage feedback signal.

1 61. (Currently Amended) A method of short circuit  
2 welding including depositing a plurality of successive  
3 drops, comprising:

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4 providing power in the form of a first waveform  
5 during a short condition and a second waveform during an  
6 arc condition to a welding wire;  
7 providing a feedback signal indicative of the  
8 output being in the short or the arc condition providing  
9 a real-time signal indicative of the heat input to each  
10 of the plurality of successive drops;  
11 controlling the power in response to the  
12 feedback such that the first waveform has a desired and  
13 controlled current waveform and the second waveform has a  
14 desired and controlled voltage waveform.

1 62. (Previously Presented) The method of claim  
2 61, further comprises comparing two signals.

1 63. (Previously Presented) The method of claim  
2 62, wherein comparing includes comparing a threshold voltage  
3 and a signal responsive to output voltage.

64. (Cancelled.)

1 65. (Previously Presented) The method of claim  
2 61, further comprising controlling the first and second  
3 waveforms to provide a desired mass deposition rate responsive  
4 to a wire feed speed and a distance from a tip of the wire to  
5 the workpiece.

1 66. (Previously Presented) The method of claim  
2 63, further comprising providing an output current feedback  
3 signal and an output voltage feedback signal to the control  
4 means, and controlling the first waveform in response to the  
5 output current feedback signal and the second waveform in  
6 response to the arc voltage feedback signal.

67. (Cancelled.)